Sri Lanka Institute of Information Technology

# B.Eng. (Hons) / B.Sc. (Hons) in Electrical & Electronic Engineering

Mid Semester Examination
Year 2, Semester I

## Object Oriented Programming (EC2492)

Duration: 1 Hour + 10 Minutes Reading Time

March 2017

Instructions to Candidates:

- This is an **open book** examination.
- Total Mark is 100.
- This paper contains 4 questions. Answer all questions.
- Reading time 10 minutes given in addition to the exam time.
- Calculators are allowed to be used.
- This paper contains 6 pages including the cover page.

## Question 01 [15 Marks]

Expects 1-2 line explanations for the segments below.

i. In the Object oriented specification describe the following terms. [3 marks]
   a. Class
   b. Instance
   c. encapsulation

ii. What's the difference between inheritance and polymorphism? [3 marks]

iii. Differentiate aggregation and composition. [3 marks]

iv. Explain the difference between method overloading and overriding. [3 marks]

v. What will happen if a static method is overridden by a subclass? [3 marks]

## Question 02 [35 Marks]

Model the following case in Java (Method headers would be accepted, no need to implement the method bodies)

In a library there are two types of users employees and members, where employees are given the capabilities of members. Library has both printed and digital media in its collection. Printed media extends from books, magazines and newspapers. Books and magazines are categorized into genres (feature, novels, thrillers, education…. etc). Digital media also follows primary categorization level educational, documentary and movies. Secondary level categorization goes as science, political, drama, thriller, sci fi for documentary and movies.
Depending on the availability media can be varied as reference only or lendable.

Please clearly indicate the relationships between respective classes. Only expects to design the entity classes.

## Question 03 [40 Marks]

Develop the java code for following algorithm.

Imagine a processor that allows each process 2 time units of its processor time at an execution cycle. Following set of process arrives in the given order to the ready queue.

| p# | Arrival time | Service time |
|---|---|---|
| p1 | 2 | 12 |
| p2 | 10 | 8 |
| p3 | 5 | 9 |
| p4 | 7 | 3 |
| p5 | 10 | 5 |

Process scheduling algorithm takes the shortest remaining service time job first unless it was just put back to the queue after execution. Ex: if a Px service time is 4 and Py service time is 5 Px is executed and in the next cycle Py is executed even though Py has higher service time remaining.

Implementation guide.
Create a suitable structure for the given processes. These processes (p1 …. p5) should reside in collection for the execution.

## Question 04 [10 Marks]

Each question carries 2 marks
Please print the answers in your answer booklet

i. Which of these statements are legal. Select the three correct answers.

A. int arr[][] = new int[5][5];

B. int[]arr[] = new int[5][5];

C. int[] arr = new int[5][];

D. int[] arr = new int[][5];

ii. How can you force garbage collection of an object?

A. Garbage collection cannot be forced.

B. Call System.gc().

C. Call System.gc() passing in a reference to the object to be garbage collected.

D. Call Runtime.gc().

E. Set all references to the object to new values(null, for example).

iii. What is the result of compiling and running the following code?

```
public class Tester {
   static int x = 4;
   public Tester() {
       System.out.print(this.x); // line 4
       Tester();
   }
   public static void Tester() { // line 8
       System.out.print(this.x); // line 9
   }
   public static void main(String... args) { // line 12
       new Tester();
   }
}
```

A. Compile error at line 4 (static x must be only accessed inside static methods )
B. Compile error at line 8 (constructors can't be static )
C. Compile error at line 9 (static methods can't invoke this )
D. Compile error at line 12 (invalid argument type for method main )
E. 44

iv. What is the result of compiling and running the following code?

```
import java.util.ArrayList;
import java.util.Collections;
import java.util.List;
public class Test{
public static void main(String[] args) {
        List<Human> humans = new ArrayList<Human>();
        humans.add(new Human(13));
        humans.add(new Human(33));
        humans.add(new Human(21));
        humans.add(new Human(21));
        Collections.sort(humans);
        System.out.print(humans.get(0).age);
        System.out.print(humans.size());
        }
}
class Human implements Comparable<Human> {
        int age;
        public Human(int age) {
```

```
            this.age = age;
        }
        public int compareTo(Human h) {
            return h.age.compareTo(this.age);
        }
    }
```

A. 333
B. 334
C. 133
D. 134
E. Compilation fails

v. Will the following code compile correctly?

```
abstract class AirPlane {
    abstract void fly();
    void land() { // line 5
        System.out.print("Landing..");
    }
}
class AirJet extends AirPlane {
    AirJet() {
        super(); // line 14
    }
    void fly() {
        System.out.print("Flying..");
    }
}
```

A. Yes, it will compile with no errors
B. No, because at line 5 method land() must be abstract since class AirPlane is abstract
C. No, because class AirJet must override method land()
D. No, because at line 14 AirJet constructor is calling the super() while AirPlane has
E. no constructor defined

******End of Question Paper******